

# Home Care Practices for Newborns in Rural Southern Nepal During the First 2 weeks of Life

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## Summary

The provision of essential newborn care through integrated packages is essential to improving survival. We analyzed data on newborn care practices collected among infants who participated in a community-based trial in rural Nepal. Analysis focused on feeding, hygienic, skin/cord care and thermal care practices. Data were analyzed for 23 356 and 22 766 newborns on Days 1 and 14, respectively. About 56.6% of the babies were breastfed within 24 h and 80.4% received pre-lacteal feeds within the first 2 weeks of life. Only 13.3% of the caretakers always washed their hands before caring for their infant. Massage with mustard oil was near universal, 82.2% of the babies slept in a warmed room and skin-to-skin contact was rare (4.5%). Many of these commonly practiced behaviors are detrimental to the health and survival of newborns. Key areas to be addressed when designing a community-endorsed care package were identified.

**Key words:** essential newborn care, neonatal, hygiene, feeding, thermal, Nepal.

## Introduction

Annually 3.6 million deaths occur among newborns [1]; 99% in low- and middle-income countries where the majority of deaths take place at home [2]. Essential newborn care practices (ENC), including promotion of immediate and exclusive breastfeeding, hygienic practices (hand washing, clean cord care) and prevention and management of hypothermia, can play a critical role in reducing neonatal morbidity and mortality in high-risk settings [3–6]. Trials of

the efficacy of integrated neonatal care packages promoting ENC have shown a 30–60% reduction in neonatal mortality [7], and have emphasized the importance of community participation in developing and implementing these interventions [8, 9].

In Nepal, association between certain care practices and morbidity and mortality has been estimated [10–12]. Risk factors from previous studies on home-based care included pre-lacteal feeding, lack of exclusive breastfeeding, a delay in drying and wrapping of the baby, compromised neonatal hygiene and exposure to risk of hypothermia [13, 14]. Home-based interventions are critical to improve neonatal survival as facility delivery (18%) and skilled attendance (41%) is low in Nepal [15]. Furthermore, within the first hour after birth, breastfeeding is initiated in only 35% of newborns, while only 26% of babies receive delayed bathing [15].

The Ministry of Health and Population in Nepal is moving forward with one such program, the Community-Based Integrated Newborn Care Program. Further information on regional or subgroup variations in household-level newborn care practices will facilitate the development of a more targeted behavior change communications

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component, and enable effective scale up of this program. In this study, we utilize data collected prospectively from more than 23 000 live births in Southern Nepal to explore home-based newborn care practices from the time of birth through the first 2 weeks of life.

## Methods

### *Parent trial overview*

Data for this analysis were collected within a community-based, cluster-randomized trial of two chlorhexidine interventions (newborn skin and umbilical cord cleansing) on neonatal mortality and morbidity in Sarlahi District of Nepal; trial details have been published elsewhere [10, 16]. Briefly, between August 2002 and January 2006, pregnant women were consented and enrolled in the study. After birth, newborns were visited in the home on Days 1–4, 6, 8, 10, 12, 14, 21 and 28; at these visits project workers noted vital status, provided the allocated chlorhexidine or control interventions, examined the baby and recorded morbidities reported by the caretaker.

### *Data sources for care practices*

At Days 1 and 14, extensive assessments of ENC practices were conducted. Day 1 questions focused on care provided immediately after delivery, while Day 14 assessment inquired more comprehensively about feeding practices, hygiene and skin care and thermal practices. Gestational age was estimated as the average of two estimates of time since last menstrual period as reported by pregnant women—at initial enrollment at mid-pregnancy and after delivery. Babies were weighed using a digital neonatal scale accurate to 2 g. Standard cutoffs for weight (<2500 g) and gestational age (<37 weeks) were utilized. Home births were defined as those occurring at home, at the mother's home (i.e. her parent's home, or *maiti*) or outdoors. Facility births included births at a health post/clinic or at a hospital. Although these data were collected within the context of an intervention study, the parent trial did not include a major emphasis on behavior change surrounding neonatal practices. Furthermore, there are no substantial differences between the groups of that trial in terms of neonatal care practices.

### *Analysis*

Analysis was descriptive and focused on immediate newborn care practices and practices during the first 2 weeks of life. Frequency of exposure variables were examined using Stata 10.0 (Stata Corp, College Station, TX, USA). The Nepal Health Research Council (Kathmandu, Nepal) and the Committee

on Human Research at Johns Hopkins Bloomberg School of Public Health (Baltimore, USA) provided approval.

## Results

There were 23 662 infants born alive between August 2002 and January 2006. Caretakers of 23 356 infants (98.7%) and 22 766 infants (96.2%) provided data during visits on Days 1 and 14, respectively. Missing/unknown responses were excluded from analysis, as reflected in the varying totals used in the analysis of specific care practices. In all, there were 759 neonatal deaths during the study period, corresponding to a neonatal mortality rate of 32.1/1000 live births. Characteristics of the babies are found in Table 1 and a summary of immediate care practices, including care prior to placental delivery, cord care practices and immediate bathing practices are shown in Table 2.

### *Feeding practices*

Overall, 771 (3.4%) and 12 191 (56.6%) were breastfed within 1 and 24 h of birth, respectively, with a mean initiation time of 22.7 h (SD: 22.2) and a median of 18.4 h (Table 3). While colostrum was given to 18 625 infants (81.2%), pre-lacteal feeding was also common (67.7%). With the exception of 'ghee' (clarified butter), which was commonly given only once, pre-lacteals were given to the infants with a high frequency (more than seven times). Overall, 19 004 infants (80.4%) received any pre-lacteal feeds taking into account differing information collected by two questionnaires, on Days 1 and 14.

### *Hygiene, skin care and thermal care practices*

Infants were washed a mean of 2.3 times (SD: 1.0); most commonly water was poured over the baby (96.5%) and water was warmed in almost all cases by either adding hot water to cold water (63.7%) or by warming the water directly (33.1%) (Table 4). Furthermore, 19 132 (84.0%) caretakers believed that the use of clean/new cloth should be delayed, usually (79.9%) until age 6 days, which is a common age for the traditional naming ceremony in Nepal.

Mustard oil was universally applied to the skin of infants (22 971; 99.8%). Reasons cited for this practice included: to make the baby's body strong (69.6%), to keep the baby healthy (41.4%), to keep the baby warm (36.8%) and to make the skin look good (23.7%). Baby powder was the second most common substance applied to the infants' skin (2897; 12.7%), but unlike mustard oil, powder was most frequently applied after 48 h (90.7%). Caretakers applied powder to prevent skin infection

TABLE I  
*Characteristics of babies available for analysis*

Characteristics	N (%)
Sex ( <i>n</i> = 23 662)	
Male	12 195 (51.5)
Female	11 467 (48.5)
Birth weight (g) ( <i>n</i> = 22 746)	
≥2500	15 399 (67.7)
<2500	7347 (32.3)
Gestational age, weeks ( <i>n</i> = 23 649)	
>37	19 329 (81.7)
34–37	3822 (16.2)
<34	498 (2.1)
Small for gestational age ( <i>n</i> = 22 750)	
Small weight for gestational age	12 605 (55.4)
Normal weight for gestational age	10 145 (44.6)
Birth Location ( <i>n</i> = 22 364)	
Non-facility <sup>a</sup>	20 135 (90.7)
Facility	2069 (9.3)
Assistance at delivery ( <i>n</i> = 22 294)	
Unskilled	20 160 (90.4)
Skilled <sup>b</sup>	2134 (9.6)
Electricity in household ( <i>n</i> = 23 273)	
Yes	5662 (24.3)
No	17 611 (75.7)
Mother literate ( <i>n</i> = 23 650)	
Yes	6081 (25.7)
No	17 569 (74.3)
Ethnic origin ( <i>n</i> = 23 273)	
Pahadi	6627 (28.5)
Madeshi	16 646 (71.5)

<sup>a</sup>Includes own home, home of maternal kin, or outdoors.

<sup>b</sup>Defined in this study as any ANM-assisted delivery, or a delivery in a facility assisted by a doctor. This may underestimate coverage of skilled care at birth if some home births were assisted by qualified physicians, although this is rare.

(38.3%); other responses were related to the healing of rashes and wounds and to improve skin appearance.

### Discussion

Newborn care practices observed in this setting may contribute substantially to the continued high risk of poor outcomes in newborns. These data expose specific priority areas for targeted behavior change communications, which are vital when designing newborn care packages to improve neonatal survival in the community.

#### *Practices immediately following delivery*

The majority of babies did not receive adequate care before placental delivery. Neglect of the newborn prior till placental delivery is consistent with a recent review of five countries in Africa [17] and in South Asia [6, 18]. Delaying newborn care can increase hypothermia risk (temperature <36.5°C), especially since most cooling of the infant occurs 10–20 min after birth [19, 20]. Prior analyses from

this population estimated that 81.2% of babies had hypothermia during the first week of life [21] and low observed temperatures were associated with substantially increased mortality risk [22]. The use of a new blade to cut the cord [97.7%] is due to the distribution of clean birthing kits during the study, and does not reflect customary practice; in 2006 DHS data, 61% of cords were cut with a clean blade [15].

#### *Feeding practices*

Only 56.6% of the babies in this study were breastfed within the first 24 h after birth, which is substantially lower than DHS data [15] for the plains region of Nepal (75%) or within a cross-sectional study [13] in a nearby hills district (95%). Our observation was more consistent with DHS data from 29 African countries showing an average early initiation proportion of only 44% [17]. A high proportion of infants received pre-lacteals (80.4%), consistent with other regional [6, 23, 24], and sub-Saharan African data [17]. This practice has been linked with increased risk of malnutrition,

TABLE 2  
Key newborn care practices immediately following delivery

Care practice	N (%)
Care before the placenta comes out	
Baby wiped with cloth ( <i>n</i> = 21 594)	3887 (18.0)
Baby wrapped with blanket ( <i>n</i> = 21 637)	4812 (22.2)
Baby given massage with oil ( <i>n</i> = 21624)	302 (1.4)
Baby washed with water ( <i>n</i> = 21601)	110 (0.5)
Other <sup>a</sup> ( <i>n</i> = 21610)	526 (2.4)
Cord care	
Cord was cut after the placenta came out ( <i>n</i> = 23 606)	20 986 (95.6)
Instrument used to cut the cord ( <i>n</i> = 21 517)	
New blade	21 023 (97.7)
Other <sup>b</sup>	494 (2.3)
Substance applied to cord immediately after cutting ( <i>n</i> = 21 410)	4019 (18.8)
Mustard oil ( <i>n</i> = 4019)	1797 (44.7)
Antiseptic ( <i>n</i> = 4019)	1504 (37.4)
Ash ( <i>n</i> = 4019)	418 (10.4)
Mud ( <i>n</i> = 4019)	128 (3.2)
Other <sup>c</sup> ( <i>n</i> = 4019)	191 (4.8)
Baby's first wash	
Wash given after 6 h ( <i>n</i> = 22 104)	5134 (23.2)
Baby was washed with water ( <i>n</i> = 22 237)	19 690 (88.6)
Substance added to water ( <i>n</i> = 19 504)	
Nothing added	18 982 (97.3)
Soap/detergent added to water	264 (1.4)
Bath/body soap	72 (0.4)
Detergent	101 (0.5)
Other <sup>d</sup>	85 (0.4)
Care after being washed	
Baby wrapped in cloth ( <i>n</i> = 19 616)	19 558 (99.7)
Baby massaged with oil ( <i>n</i> = 19 601)	17 208 (87.8)
Baby warmed near fire ( <i>n</i> = 19 566)	8784 (44.9)
Feeding practices before first visit	
Baby was breastfed since birth ( <i>n</i> = 22 332)	11 673 (52.3)
Anything other than mother's milk given ( <i>n</i> = 23 300)	
Nothing	5430 (24.4)
Animal/goat milk	11 321 (50.8)
Other mother's milk	4470 (20.0)
Honey	4019 (18.0)
Water	2476 (11.1)
Ghee	1055 (4.7)
Other <sup>e</sup>	425 (1.9)

<sup>a</sup>'Other' care included covering the baby by cloth, keeping/putting the baby in the lap, and other care.

<sup>b</sup>'Other' instruments used to cut the cord included another blade, household knife, sickle, scissors and other instruments.

<sup>c</sup>'Other' substances applied to cord included other oil, breast milk, herbs/spices, spit and other substances.

<sup>d</sup>'Other' substances added to water include antiseptic, neem or dettol soap, and other substances.

<sup>e</sup>'Other' pre-lacteals included glucose, sugar, lactogen, powdered milk and other pre-lacteals.

infection and mortality [11, 25]. Colostrum feeding, however, was reported at high levels, a positive finding in contrast to many previous observations [17, 26].

#### Hygiene practices

In our study, only 13.3% of caretakers always washed their hands before handling the baby, and among these, less than one-third washed with soap. Poor hand washing practices are common globally, especially in developing countries [27]. Given existing

data from our study site linking improved hand washing practices with neonatal survival [12], understanding barriers to improved hand washing within a cultural context is critical and can be implemented successfully. For example, in rural Shivgarh, Uttar Pradesh, hand hygiene improvements were achieved by modeling communication and guidance on the routine practice of hand washing when making curd [6].

Application of mustard oil is a customary traditional practice in Nepal and other South Asian

TABLE 3  
*Key newborn feeding practices during first 2 weeks of life*

Care practice	Proportion given		Proportion given more than seven times	
	No.	n (%)	No.	n (%)
Breastfeeding initiation within 24 hours	12 919	22 838 (56.6)	—	—
Colostrum given	18 625	22 927 (81.2)	—	—
Animal milk given	12 682	22 971 (55.2)	4068	1249 (32.5)
Honey given	5544	22 949 (24.2)	1308	5473 (23.9)
Water given	3216	22 944 (14.0)	1048	3166 (33.1)
Ghee given	1472	22 930 (6.4)	133	1453 (9.1)
Sugar given	298	22 929 (1.3)	98	280 (35.0)
Other <sup>a</sup>	869	22 907 (3.8)	510	873 (58.4)

<sup>a</sup>‘Other’ included powdered milk, breast milk from another mother, turmeric, litto, cough syrup, cough drops, ginger, vitamins and others.

TABLE 4  
*Key newborn hygiene, skin care and thermal practices during first two weeks of life*

Care practice	N (%)
Baby was washed ( <i>n</i> = 22 941)	22 784 (99.3)
1–13 washes	22 769 (99.9)
Cleansing substance used ( <i>n</i> = 22 738)	
Nothing	147 (0.7)
Bath or body soap	21 330 (93.8)
Antiseptic or neem soap	1045 (4.6)
Detergent	164 (0.7)
Other <sup>a</sup>	52 (0.2)
Hands washed hands before handling baby ( <i>n</i> = 22 898)	
Never	11 977 (52.3)
Sometimes	7886 (34.4)
Always	3035 (13.3)
Substance used to clean hands ( <i>n</i> = 10 906)	
Water	7234 (66.3)
Water and soap	3509 (32.2)
Antiseptic or neem soap	49 (0.5)
Ash	54 (0.5)
Other substances <sup>b</sup>	60 (0.6)
Mustard oil applied ( <i>n</i> = 22 971)	22918 (99.8)
Time of application ( <i>n</i> = 22 746)	
Within 1st hour after birth	11 224 (49.3)
1–6 h after birth	9470 (41.6)
6–24 h after birth	1539 (6.8)
24–48 h after birth	309 (1.4)
After 48 h	204 (0.9)
Frequency of application ( <i>n</i> = 22 871)	
Every day	1352 (5.9)
2–3 times per day	19 163 (83.8)
> 3 times per day	2161 (9.5)
Once a week	126 (0.6)
Twice a week	69 (0.3)
Powder applied ( <i>n</i> = 22 859)	2897 (12.7)
Ghee applied ( <i>n</i> = 22 845)	95 (0.4)
Lotion applied ( <i>n</i> = 22 853)	135 (0.6)
Other applied <sup>c</sup> ( <i>n</i> = 22 762)	317 (1.4)
Room where baby sleeps is warmed ( <i>n</i> = 22 949)	18 859 (82.2)

(continued)

TABLE 4  
*Continued*

Care practice	N (%)
Reason for warming the room ( <i>n</i> = 18 859)	
Prevent baby from cold	10 651 (56.6)
Warm up the baby	5581 (29.6)
Ward off spirits/evil	11 221 (59.5)
Fire wards off mosquitoes/snakes	2819 (15.0)
Other <sup>d</sup>	490 (2.6)
Hat or covering placed on baby's head ( <i>n</i> = 22 944)	18 882 (82.3)
Frequency of covering of head ( <i>n</i> = 18 762)	
Every day	15332 (81.7)
Sometimes	3215 (17.1)
Rarely	155 (0.83)
Other <sup>e</sup>	60 (0.32)
Skin-to-skin contact to warm baby ( <i>n</i> = 22 850)	1017 (4.5)
Time since birth ( <i>n</i> = 982)	
<1 h after birth	279 (28.4)
1–6 h after birth	450 (45.8)
6–24 h after birth	133 (13.5)
24–48 h after birth	43 (4.4)
After 48 h	77 (7.8)
Frequency of skin-to-skin contact ( <i>n</i> = 836)	
Once a week	192 (23.0)
Twice a week	109 (13.0)
Every day	448 (53.6)
2–3 times a day	25 (3.0)
>3 times a day	62 (7.4)
Baby was cold ( <i>n</i> = 22 857)	1601 (7.0)
How did you know baby was cold ( <i>n</i> = 1567)	
Cold to the touch	1130 (72.1)
Baby was shivering	124 (7.9)
Baby's skin was pale/blue	23 (1.5)
Other	290 (18.5)
Actions taken ( <i>n</i> = 1601)	
Nothing	36 (2.25)
Gave baby massage	1009 (63.0)
Gave more clothes/blanket	771 (48.2)
Put baby near fire	886 (55.3)
Other <sup>f</sup>	255 (15.9)

<sup>a</sup>'Other' methods of cleansing included dettol, shampoo, neem leaf, water and other methods.

<sup>b</sup>'Other' substances to clean hands included mud and soil, soap alone and other substances.

<sup>c</sup>'Other' applications included garlic, aptan, fenugreek, caraway seed, various oils and other applications.

<sup>d</sup>'Other reasons' included to warm the mother, cultural reasons and other reasons.

<sup>e</sup>'Other' ways of knowing included being told by others, due to cough and cold, vomiting and other ways.

<sup>f</sup>'Other actions' included giving medicine, giving drops and other actions.

countries [28, 29]. Mustard oil, however, may increase risk of transepidermal water, heat loss and poor recovery of skin integrity after massage [30]. Improving massage practices and/or substituting a skin barrier-enhancing emollient (e.g. sunflower seed oil) may reduce infections and mortality [31], but further population-based research is needed. Baby powder and other topical applications were less routinely applied and were primarily targeted to prevent skin infection and to heal rashes and wounds. Data on the use of baby powder or other

skin treatments for newborns in low-resource settings is scarce, but necessary to guide recommendations.

#### *Thermal practices*

While the WHO recommends delayed bathing beyond 6 h [20], such a delay in this setting was rare (11.7%) and consistent with prior Nepal data where immediate bathing was near-universal [13]. Most babies slept in a room that was warmed and/or provided a hat to keep warm, but skin-to-skin contact was rarely practiced. A recent review noted a



significant reduction in mortality among preterm babies who received kangaroo-mother-care (KMC) starting in the first week of life [32]. High levels of community acceptance and uptake have been achieved elsewhere. For example, in Uttar Pradesh, incorporation of this practice was likely a key factor in cutting mortality in half [6, 33]. Hypothermia risk may be decreased with skin-to-skin contact, as demonstrated in Uganda [34], but this protective effect was not observed in our prior analyses of hypothermia in this setting [35]. This observation could arise in this setting if skin-to-skin contact is primarily a reactive, rather than a proactive, practice, more likely to be done when the baby is perceived to be cold. In general, newborns in rural Nepal and beyond would likely benefit from contextually appropriate behavior change communication messages directed at the importance of maintaining the warm chain of the baby, especially in the immediate postpartum period.

### Conclusion

This analysis of more prospectively collected newborn care practices among more than 23 000 newborns has identified priority areas that should be included in a package of interventions to improve neonatal survival. Successful implementation of these mostly behavior change strategies will require cultural and contextual adaptation and emphasis during the antenatal period, at birth, through the neonatal period. At birth, immediate care of the neonate is critical and includes wrapping, drying and optimal cord care. To reduce infections and improve developmental outcomes, early initiation of breast-feeding, reduction and/or elimination of pre-lacteal feeding, and a community-endorsed strategy to increase appropriate hand washing techniques are priorities. Future efforts to improve thermal care should focus on the benefits of year round maintenance of the warmth chain, particularly among low weight babies. While these interventions are cost-effective and based on evidence, consideration must be given to phased implementation to achieve high acceptability and sustained changes in behavior. Successful development and implementation of a newborn care package focused on gaps in care could contribute to substantial reduction in neonatal mortality in Nepal.

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